

***Recommended Cropland Policy on Neonicotinoid Pesticides and Pollinators:***

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***15 October 2011; updated 27 October 2011; updated 15 Nov 2011***

**Policy Statement:**

***Boulder County Parks and Open Space lands should ban the use of all neonicotinoid pesticides on its lands, both croplands, rangelands and other locations.***

**Rationale:**

The systemic pesticides called neonicotinoids have been connected as a causative and/or contributing agent in honey bee colony collapse disorder (CCD). CCD is directly affecting bee populations in Boulder County and many beekeepers have experienced major colony losses and honey production declines in the last year alone. Bees and other pollinators are beneficial insects that serve to pollinate many important local food crops, and some species serve as predator controls of other insects that are harmful to food crops. These pesticides are also known to cause declines in avian life and to be toxic to aquatic life, terrestrial invertebrates, mammals and other species in the general environment. They have very long half lives with cumulative buildup potential in the soils and plant tissue. Very little research has been uncovered on the toxic effects to humans via foods and other contamination pathways, suggesting much more research is needed. To limit these harmful effects to our environment, particularly our important pollinators, and the potential effects on our foods and human health, these chemicals and their use should be banned on public lands owned and controlled by the county, most notably Parks and Open Space croplands. These chemicals are detrimental to and incompatible with sustainable agricultural practices.

**Summary Background: *Neonicotinoids*** (Clothianidin, Imidacloprid, and other neonicotinoids, sold under various tradenames such as Poncho, Votiva, Propser, etc.) -

One example of an unintended consequence and unsustainable agricultural practice is the use of family of systemic pesticide chemicals known as the neonicotinoids. This class of pesticides is commonly used for seed treatments as a systemic insecticide, notably on canola, mustard, rapeseed, corn (including field, sweet and popcorn) and sorghum. Other uses are also now involving direct application to soil surface and foliage at much higher rates than in seed coatings, for turfgrass, tobacco, apples, pears and ornamentals, in other words many that situations that may even be used in homeowner applications.

For a long time, it has been known that nicotine and its related compounds and derivatives are toxic, not just to tobacco smokers but to other life-forms, some of which are agricultural pests. One of the most common currently used neonicotinoids is clothianidin, a product of Bayer Crop Sciences, a

major European agricultural chemical company. This chemical is used as a seed coating, and in direct soil and foliar applications, and in other delivery methods. This chemical is a persistent chemical in aerobic soil conditions with a half life of 148 days up to 1155 days (3). For eventual activity or chemical-physical-metabolic decay it would therefore take up to about 32 years to reach low or near zero levels. In other words it is a very persistent chemical pesticide with long term consequences to soil health and the environment. Furthermore it is quite stable to hydrolysis degradation at most common environmental pH and temperature conditions. With repeated use, it can therefore build up in soils and create unhealthy soil concentrations. Being water soluble systemic pesticides, neonicotinoids move into the plant tissue by vascular pathways, even to flower parts, and can consequently expose pollinators to repeated intakes of contaminated nectar and pollen. This also means that the pesticide is taken into the food and animal feed parts of crops. Little if any research has been found regarding these pathways and possible health effects to animals or humans eating these crops. These pesticides are classified as mobile to highly mobile in soils and can also readily move into ground and surface water. Methods of application involving soil or foliar applications, since they are typically at higher rates than with seed coatings, represent a definite risk to the potential for leaching into ground water or contaminating surface water by runoff from fields. EPA risk assessment documents for use with corn and canola refer to clothianidin as “having “extreme mobility and persistence ...in the environment.” (5)

Negative effects on aquatic invertebrate animals and aquatic vascular plants have been documented in the field due to contamination of water. Acute and chronic risks to avian and mammalian species have also been identified from exposures, particularly related to use, spills, and storage of clothianidin for treated seeds (3). Studies also indicate toxic effects on terrestrial invertebrates such as earthworms, and non-vascular plants such as algae. Indicator test aquatic species such as daphnids also have been shown to be sensitive at chronic levels as low as 0.12 ppm, resulting in reproductive effects. Clothianidin was found to be highly toxic to sediment dwelling aquatic invertebrates (*Chironimus riparius*, midge) were found to express toxicity at levels LC50 of 11 ppb, and NOACE of 1.1 ppb, and *Leptocheirus plumulosus* with LC50 at 20.4 ppb, NOACE of 11.6 ppb.

Colony collapse disorder (CCD) with honey bees is a complex issue, with the probability that it is caused or contributed to by many interconnected factors. Increasingly, certain pesticides are being found to contribute to this problem which otherwise may appear to be caused by mites, fungi and other causes. The neonicotinoid pesticides are now linked to these disease and pest causes through stresses to the health of honey bees, and subsequent lowered resistance to other contributing agents of CCD.

Acute high toxicity effects to honey bees are noted in internal EPA risk assessments. And storage of gathered clothianidin in bee hive food pollen and nectar stocks become repeat dosages of the chemical toxins, causing chronic buildup and exposures of the bees, particularly to the larvae and long life queen. While the lower levels of the chemicals are not always detectable in the bee, in controlled studies with known exposures have shown correlations to bee health effects and toxicity. One study showed mortality, and negative effects on pollen gathering, plus reduced honey yields. Linkages are now being discovered between bee stress, increased presence of fungal pathogens such as *Nosema ceranae*, and reduced disease resistance by bees.

The EPA approved the use of clothianidin in 2003 on the condition that Bayer Crop Science conduct chronic toxicity effects. EPA refused to release the Bayer studies, still only saying their determinations are “scientifically sound”. To open the records of EPA, the Natural Resources Defense Council (NRDC) sued EPA in 2008 for access to the documents held in secret. Eventually they were published and upon independent review found to be “woefully inadequate”. Since the introduction in the U.S. and wide scale use with crops, U.S. bee colonies have declined by 30 to 90 percent. (7)

While many wish to rely on the federal regulatory agencies to protect our environment and health, Tom Theobald, a respected Boulder county beekeeper, late in 2010, uncovered and released new 2010 EPA scientific risk assessment documents which refute the prior official EPA approval record of determination for pesticide registration of clothianidin (1)(2). Unfortunately, secrecy is still the rule because even EPA pesticide review reports do not provide scientific references or access to the actual toxicological reports submitted by the chemical company applicants. In addition, there are no open literature citations listed in the EPA report that can be reviewed independently. As a result, no independent scientific evaluation is reasonably possible.

Statements by the EPA scientists in the 2010 EPA report are nevertheless revealing. They state, regarding a previous field study (MRID 46907801/46907802) which supported prior clothianidin registration, “deficiencies were identified that render the study supplemental” and “it does not satisfy the [EPA] guideline 850.3040 and another field study is needed to evaluate the effects of clothianidin on bees through contaminated pollen and nectar. Exposure through contaminated pollen and nectar and potential toxic effects therefore remain an uncertainty for pollinators.” (3) The EPA report further states, “it appears that clothianidin exposure to honeybees has the potential for high toxicity on both an acute contact and oral basis” and it quotes, “one honeybee study showed that mortality, pollen foraging activity, and honey yield were negatively affected by residues of clothianidin.” (3)

An unpublished report from a top USDA bee researcher, Jeffrey Pettis, of the Beltsville Agricultural Research Service (ARS) Bee Research Laboratory, has reportedly also found the Bayer Crop Sciences manufactured clothianidin pesticide harmful to honeybees, with potential links to CCD and co-pathogen fungal proteins, the effects observed even at below detection limits for the neonicotinoid (3). This study is a collaborative work with entomologist of Dennis van Engelsdorp of Penn State University. We still await the public release of this important report, and may ultimately need to use Freedom of Information Act methods for its disclosure since it was completed two years ago. While waiting for release, both Pettis of ARS and van Engelsdorp of Penn State have spoken publicly on the documentary film, *The Strange Disappearance of the Honeybees*. Pettis describes their study in which two sets of honeybees were exposed to a known fungal pathogen (*Nosema ceranae*), one set also exposed to a neonicotinoid, the other a control and not exposed. In the film Pettis states, “...we saw an increase, even if we fed the pesticide at very low levels--an increase in *Nosema* levels--in direct response to the low level of feeding of neonicotinoids, as compared to the ones which were fed normal protein.” Van Engelsdorp noted that the neonicotinoid exposures of the bees were below detection limits in the bees. He notes, “the only reason we knew the bees were exposed is because we exposed them.” These findings reveal how incredibly complex are the issues of introduced environmental toxins, even at

exceedingly low levels, in our environment; and that they can go unnoticed by science, but still have profound implications to ecosystems.(2)

This bee colony disorder is a serious problem with our important pollinators and many important food crops depend upon bees. Many ornamental and wild flowering plants are also served by bee pollinators. The issue is too important both locally and nationally to be left to the slow and sometimes politically influenced processes of the federal agencies. The National Honey Bee Advisory Board, American Beekeeping Federation, American Honey Producers Association, Beyond Pesticides, Pesticide Action Network North America and the Center for Biological Diversity have all petitioned EPA to review its decision to allow use of clothianidin (4). This wake up call is heavily based upon the uncovered internal documents from EPA's own scientific staff, as well as emerging scientific studies by the US. Department of Agriculture, Bee Research Laboratory in Beltsville, Maryland.

Several European Union nations have already banned these chemicals, including Germany where many of them continue to be manufactured and sold to the rest of the world. Bans are in place in Italy, Slovenia and France (7) with others under petition for review and disapproval, including the UK. At least on retailer in the UK, the Co-operative Group, announced with its "Plan Bee" that it would prohibit the use of eight different insecticides for use with its brand of fresh produce to help reverse the decline in British honeybees. (8) The UK has reportedly banned the direct spraying of clothianidin, only allowing it with seed treatment. The ban in Germany of clothianidin and seven other insecticides immediately followed a dramatic die off in 2008 of 50-60% of bees, the incident linked to aerial drift releases of neonicotinoids from treated maize (corn) sowing, and according to the German Professional Beekeepers' Association, some beekeepers lost all of the hives. (8)

Precautionary action now rather than belated regret is called for by local governments since the federal agencies are not acting on this strong evidence. Specifically Boulder County needs to protect its citizenry and the ecosystem inhabitants under its stewardship, such as our essential honeybee pollinators, and other non-target affected beneficial insects, birds, terrestrial invertebrates, and aquatic life, even we humans who are also being exposed without an understanding as to the health effects on us. Until science can prove pesticides such as the neonicotinoid group of insecticides are absolutely safe, they must be banned from use. Such materials are simply incompatible with the practice of ecological and agricultural sustainability.

### **References:**

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- (3) DeCant, J. and M. Barrett, U.S. Environmental Protection Agency, Office of Chemical Safety and Pollution Prevention, executive memorandum and report of Environmental Risk Assessment on subject: Clothianidin Registration of Prosper T400 Seed Treatment on Mustard Seed (Oilseed and Condiment) and Poncho/Votivo Seed Treatment on cotton, PC Code 044369, Nov 2, 2010. (This document also internally references other EPA documents which were the basis of prior registrations for clothianidin. It is notable in that it defines many uncertainties and inadequacies in the previous approvals of this pesticide.)
- (4) Letter to U.S. EPA Administrator and office of Pesticide programs, Dec 8, 2010 from and multiple signers representing six honey bee and pesticide groups: National Honey Bee Advisory Board, American Beekeeping Federation, American Honey Producers Association, Beyond Pesticides, Pesticide Action Network – North America, Center for Biological Diversity.
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- (7) Darlington, D., None of your beeswax, Sierra, Vol. 96, No.4, Jul/Aug 2011, p. 18.
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**Additional peer reviewed scientific papers regarding neonicotinoid pesticides:**

(for supplemental reading; not reviewed in the above paper)

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- g. Fischer, D. and T. Moriarity (Eds.), Pesticide Risk Assessment for Pollinators: Summary of a SETAC Pellston Workshop, 15-21 January 2011, Pensacola, FL, USA (document released Sept 2011). [http://www.setac.org/sites/default/files/executivesummarypollinators\\_20sep2011.pdf](http://www.setac.org/sites/default/files/executivesummarypollinators_20sep2011.pdf)
- h. Flottum, Kim, Editor of Bee Culture Magazine, critique of the SETAC document (item g. above), 4 pages. [kim@BeeCulture.com](mailto:kim@BeeCulture.com)
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